DOCUMENT RESUME

ED 421 128 IR 018 848

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TITLE Leadership for a Technology-Rich Educational Environment.
PUB DATE 1998-00-00
NOTE 6p.; In: "SITE 98: Society for Information Technology & Teacher Education International Conference (9th, Washington, DC, March 10-14, 1998). Proceedings"; see IR 018 794.
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Access to Education; *Administrator Role; Educational Administration; *Educational Environment; Educational Objectives; *Educational Technology; Elementary Secondary Education; Evaluation; *Instructional Leadership; Time Factors (Learning)
IDENTIFIERS Access to Technology; Support Services; *Technology Integration; Technology Role

ABSTRACT

This paper emphasizes the importance of exploring the attitudes, skills, and knowledge that will enable individuals in educational leadership positions to function effectively and to provide support to create and maintain technology-rich educational systems. The discussion is guided by the following five elements, the understanding of which are essential to the meaningful integration of technology into the teaching and learning environment: (1) vision, including the importance of developing a vision of the role of technology in learning that can give direction to decisions about the purchase, deployment, support, and use of the technology; (2) access, including a comprehensive definition of access that includes the capabilities of the hardware in the school, the physical arrangement of technology in the building, the existing systems of support related to the integration of technology, and intended uses of the technology as articulated in the vision; (3) time, particularly the lack of time teachers have to sit down at a computer to try out the things they learn in workshops; (4) support, including professional, instructional, and technical dimensions of support; and (5) assessment, including understanding the role of assessment, matching goals and objectives to assessment measures, and possible models and approaches. (AEF)

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Leadership for a Technology-Rich Educational Environment

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Recent political and media campaigns have suggested that the number of computers in the school building is a measure of the value of that school. School districts and other educational institutions have responded to this public pressure by purchasing computers, installing networks, developing computer curricula, and providing teacher workshops. In spite of these efforts, schools and institutions are essentially unprepared to integrate computer technology into their everyday teaching and instructional responsibilities.

A great deal of discussion is directed at the issues related to preparing teachers to utilize new technologies, but what is abundantly clear is that the people who are expected to provide leadership and participate in key decision making processes regarding technology integration are being left out. Increasingly, educational leaders are expected to provide direction and support in a technology-rich environment without the benefit of understanding the technology and human elements that are necessary to make that technology an effective instructional tool.

Efforts to develop technology-rich educational environments have shown that there are key elements that are critical to the successful integration of computers into the everyday efforts of the people working in those environments. This paper explores the attitudes, skills, and knowledge that will enable individuals in educational leadership positions to function effectively and to provide support to create and maintain technology-rich educational environments. Our discussion is guided by five elements: vision, access, time, support, and assessment; the understanding of which we believe are essential to the meaningful integration of technology into the teaching and learning environment.

Developing A Vision

There are vague notions that using computers in schools is good. These notions are usually based on simplistic ideas that the use of computers will better prepare the student for the workforce and that there are efficiencies to be gained by their use. The truth about the use of computers is a much more complex reality that must be understood before computers and their related technologies can truly support a learning environment. A vision of the role of technology in learning must be developed that can give direction to decisions about the purchase, deployment, support, and use of the technology.

Currently, many educators believe technology and telecommunications are essential tools for supporting a transformed teaching and learning environment. The problem, however, is a lack of understanding about how technology and telecommunications are to be integrated into the educational environment. An important consideration is the role of the administrator in this transformation. The development of a vision to guide the integration of technology into the teaching and learning environment usually begins at the school level with the principal.

Writing on effective schools suggests that the principal can have a major impact on efforts to improve the organization and delivery of services to students (Bossert, Dwyer, Lee, & Rowan, 1982). McCall (1986) added that what is needed in times of reform is principals who understand the problems and critical issues of our education system. In 1994 The Education Commission of the States defined thoroughly restructured schools. Such schools ... have set high, world-class standards and ensured that those expectations are incorporated into ... classroom culture by altering curricula and instituting teaching methods that accommodate the needs of all students. They also change management and administrative policies so they reward teacher initiative and innovation.

There are several modes for effecting change in schools (Sashkin, 1988). In order to successfully foster change in an increasingly technology-rich environment, educational leaders must be adept at influencing change in a way that is appropriate to the specific school population (including teachers, parents, and students). This includes developing a vision, which guides the school decision making process regarding the integration of technology. The effective educational leader must help the school community develop a set of guiding principles about the role of technology in the learning setting that is comprehensive and practical.

Access, Time, and Support: Inseparable Essentials

Not only must educational leaders provide the stimulus for meaningful change, but also they must be creators and sustainers of teaching and learning environments that are technology-rich. Particularly, they must be aware of inseparably related issues of access, time, and support.

Providing Adequate Access

Many schools are still wrestling with the question of whether to disperse computers in classrooms around the school or bank them in laboratories. This question is really a result of inadequate levels of access to computers. Few institutions have really addressed the question of what level of access is truly required for the successful integration of computers into the life of the school. Few educational leaders understand the importance of all the issues related to access.

The conventional definition of access focuses on the number of computers, the ratio of students per computer, and the amount of other technology in the school. This definition is too simplistic to meet the challenge presented when meaningfully integrating technology into classroom instruction (Office of Technology Assessment, 1995). An effective definition of access should also include the capabilities of the hardware in the school, the physical arrangement of technology in the building, and the existing systems of support related to the integration of technology (Office of Technology Assessment, 1995). And the definition must take into account the intended uses of the technology as articulated in the vision established for the learning environment. This more comprehensive definition of access would be more likely to guide sound decision making related to providing levels of technology that would better support its meaningful integration into the educational setting.

Providing Adequate Time

Workshops on the use of computers have, in general, proven to have only minimal value in promoting the use of computers by teachers. There are many reasons for this but one clear problem is the lack of time teachers have to sit down at a computer to try out the things they learn in workshops. The typical workday for teachers does not afford the luxury of sitting down at a computer to learn how to use it. Educational leaders must understand and find solutions to the problems related to time.

Providing Adequate Support

Computers and computer networks don't always work properly, but few schools have someone who knows how to keep things running smoothly. In addition, experience has shown that, in order to develop effective integration of computer technologies into their classrooms, teachers need to have access to someone who knows the technology and understands the learning environment. Personnel costs are the largest part of any school system budget. Little flexibility is usually afforded administrators in developing new positions or realigning existing positions. Some of the most critical decisions regarding the successful incorporation of technology into the learning environment can revolve around the educational leader's understanding of the need for support and how to develop that support system.

Because they are limited to physical placement and acquisition of equipment, Maddox (1991) identified current efforts to integrate computer technology as potentially harmful to meaningful technology integration. He identifies three conditions necessary to allow success in meaningful integration of technology in schools: availability of excellent software in all content areas; sufficient access to computers and necessary hardware in individual classrooms; and teacher interest and expertise in educational computing.

The first condition, appropriate software, is a challenge for schools. The Office of Technology Assessment (1988) reports that the quantity of educational software has improved, but quality issues still remain, with much of what is available having programming and technical problems. In addition, schools are further limited in access to excellent software because of the disparity across subject areas, and the lack of software that encourages higher-level cognitive skills. In fact, the majority of available educational software focuses on lower-level skill development in drill and practice and tutorial type software programs.

Availability of computers and necessary hardware in individual classrooms is another condition to be met for meaningful computer technology integration. Maddox (1991) describes current views of computer integration as merely dispersing computers from school computer labs into individual classrooms. Instead, computer labs should be viewed as an important and necessary part of school-wide computer integration. Computer labs offer an environment in which group computer instruction can occur both for students and teachers. By dispersing lab computers into classrooms, access and time for students could be further limited. Improved efforts towards classroom integration would include the placement of computers in classrooms in addition to maintaining existing computer lab environments.

The third condition, teacher interest and expertise in educational computing, must be met in order to integrate

computer technology appropriately into classroom practice. The Office of Technology Assessment (1988) concluded in a study that the lack of teacher computer expertise produces the most significant threat to the potential of schools to integrate computer technology into classroom instruction in a meaningful way. Teacher expertise will continue to be limited as long as staff development efforts continue to be driven by efforts to increase proficiency in only particular types of software. This practice prevents an increase in teacher self- efficacy related to computer technology.

In order for teacher expertise to increase, training must focus on increasing computer knowledge, not computer experience on specific software programs. Reinen and Plomp (1993) studied staff development and computer integration and concluded that appropriate staff development in computer technology may be the single most influential contributor to computer integration in classroom practice. Teachers identified in this study as exemplary computer-using teachers tended to come from school districts that invested heavily in computer technology staff development. Reinen and Plomp (1993) indicate that staff development topics related to pedagogical/instructional aspects seem to offer the greatest contribution to the integration of computers in the classroom. Pedagogical/instructional topics include applications, program analysis, programming, and hardware/software knowledge (Reinen & Plomp, 1993).

Three areas of support must complement a comprehensive technology-rich environment: professional, instructional, and technical. Each of these dimensions of support is paramount if technology is to be implemented and used in an effective manner. However, that is not to say that each function needs to be the responsibility of a different person. Often, these functions may overlap and may be administered by one person on the building level. Some duties may be shared by a position that attends to several school sites. The danger in combining these functions is that a single person will have so many responsibilities, none of them will be performed well.

Support is an issue that must be addressed in the technology plan from its conception. Once a plan is in place, it may be too late due mainly to its costs in relation to the one-time investments in much of the plan.

An analogy which describes computer technology as a tool of instruction may be helpful in defining access, time, and support (Maddox, 1991). In contrasting computer integration and handwriting instruction, an example of an instructional tool that is eventually integrated across all subject areas would emerge. We would not approach handwriting simply by placing a pencil in each classroom and expect integration to occur in a meaningful way. Instead, we invest in instructional materials, devote an amount of time each day to instruction, and periodically evaluate progress. Once students develop basic skills, this intensive instruction ends and activity is integrated into the instruction of all subjects. Remediation is provided when necessary. If we also approach computer integration in this way, issues of access, time, and support seem clearer.

Decisions we make about computer integration should not always be limited to placing more computers in every school or classroom. As computer basics are acquired, computer technology could be integrated across subject areas. The important point in all of this is that integration will not occur without an increase in student and teacher expertise.

The Role of Assessment

Existing assessments, to which teachers are held accountable, do not address the types of learning and progress that students using computers make. Understanding that discrepancy and directions that can be taken to reduce the discrepancy become an important element in being an effective educational leader.

In order to assess the impact technology integration has on student outcomes, teacher instructional practices, and administrative organization practices; informal and formal data should be collected from multiple sources. The goal of this assessment and evaluation model is to determine which technology integration models or approaches will best serve schools. Such a determination can be made by creating an understanding the role of assessment in educational technology integration, matching goals and objectives to assessment measures, and creating possible effective integration models from the data collected.

Understanding the Role of Assessment

The assessment process is to be used to guide teachers' and administrators' infusion of technology into their daily school environment. The assessment should mirror the School Technology Commissions' recommendations that expected results of technology in the school environment to increase student learning, workforce readiness, teacher productivity, and cost effectiveness. In addition, the assessment and evaluation information should identify areas on which to focus professional development.

Matching Goals and Objectives to Assessment Measures

In order to match the School Technology Commissions' recommendations with the objective of expanding teachers' and administrators' understanding of both new technology and new teaching techniques, several quantitative and qualitative evaluation methods must be employed. One possible route to match goals to assessment measures is to take strands of student, teacher, and administrator technology practices and apply them to a model of computer use in schools. Such a model matches the relationship between student technology interaction and student cognition. Simply, in the assessment process we match the level of computer interaction to the level of cognition. When this

model is applied, we must consider the role of the student, teacher, and administrator (Makrakis, 1988).

Possible Models and Approaches

According to the three major achievement test publishers, true student performance-based tests are non-existent. At best, the evaluation process can capture student attitudes toward technology and students' interaction with technology as a learning tool. Conducting interviews with student focus groups can be an effective way to collect information regarding meaningful student interaction with technology across the curriculum. Affective instruments, designed to determine attitudes toward technology, may identify the effectiveness of current classroom technology practices to increase students' comfort with computer technology. The Educational and Psychological Measurement's "Computer Attitude Scale" may be used for students, teachers, and administrators (Bannon, 1985). Other attitude surveys include the Estes Attitude Scales (1987) and the Shaver Attitudes toward Writing with the Computer Scale (1990).

While attitude questionnaires may be employed with students, teachers, and administrators, most systems will seek a more achievement-oriented approach. The Macmillan/McGraw Hill Curriculum Frameworks Assessment test includes basic core curriculum subjects and mathematics technology. While costly, these batteries of tests provide schools with quantitative scores to match to attitude questionnaire outcomes, and student focus group outcomes. Only by webbing these multiple assessment approaches may schools create a learning environment that fosters access, time, and support.

Conclusion

Work with administrators in K-12 schools and with students in educational administration programs have shown that none of these issues of vision, time, access, support, and assessment is clearly understood by decision-makers. Many educational leaders are struggling with what they need to know personally about technology and with ways to support the efforts of their teachers and staff to incorporate that technology into the learning environment. Few educational leaders are users of the technology themselves, and even fewer have had training in their preparation programs or as part of professional development efforts to deal with the larger issues that are introduced when computer technology is brought into their domain. Just as we attempt to discover the best means through which to train classroom teachers in the effective uses of technology in their curriculum, we also must explore the skills, attitude, and knowledge an educational leader needs to be successful in a technology-rich environment. What training and experiences will lead to leadership practices that adequately support teachers as they integrate technology? What support do educational leaders need as they make the effort to bring technology integration into their schools?

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